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Absolute Value Rules

Algebra rules for absolute values are listed below.

Piecewise Definition:
$$|a| = \begin{cases} a & \text{if } a \geq 0 \\ -a & \text{if } a < 0 \end{cases}$$

Square root definition:
$$|a| = \sqrt{a^2}$$

Rules:

1. $|-a| = |a|$

2. $|a| \geq 0$

3. Products: $|ab| = |a||b|$

4. Quotients: $|a/b| = |a|/|b|$

5. Powers: $|a^n| = |a|^n$

6. Triangle Inequality:
   $|a + b| \leq |a| + |b|$

7. Alternate Triangle Inequality:
   $|a - b| \geq |a| - |b|$

CAREFUL!!   Sums: $|a + b|$ is not the same as $|a| + |b|$

Differences: $|a - b|$ is not the same as $|a| - |b|$

See also

Absolute value of a complex number, triangle inequality (geometric)